

THE MEALY-BUGS
(PSEUDOCOCCIDAE : HOMOPTERA)
DESCRIBED BY W. M. MASKELL, R. NEWSTEAD,
T. D. A. COCKERELL AND E. E. GREEN
FROM THE ETHIOPIAN REGION

BY

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INADEQUATE descriptions have caused some difficulty in naming many African mealy-bugs submitted for identification and in order to facilitate this work in the future it was thought desirable to redescribe or review all the known species found south of the Sahara.

Mr. G. De Lotto of the Department of Agriculture, Kenya, and the present writer proposed to co-operate in this work of redescription, but due to difficulties of distance it was decided that it would be easier for one of us to deal with all of the species described from Africa by any given author, and to leave until later the description of new species. The first of these papers, dealing with the mealy-bugs described by H. C. James, has already been completed by Mr. De Lotto (*Bull. B.M.(N.H.) Ent.*, 5, No. 5) and the present one will review all those mealy-bugs described by Maskell, Newstead, Cockerell and Green.

This work has been largely influenced by the recent publications of Ferris (*in* Zimmerman, 1948) and Ferris (1950) dealing with the mealy-bugs of North America and many of the terms adopted by Ferris will be used here. Reference has also been made to Borkhsenius (1949), writing on the mealy-bugs of the U.S.S.R., and to a recent paper by Ezzatt & McConnell (1956) dealing with the tribe Planococcini. Many species found in Africa have been adequately described and illustrated in the foregoing papers and, therefore, it is not intended to redescribe them here.

Some of the species to be dealt with cannot be properly assigned to any known genus and as the main purpose of the present paper is to redescribe species, the erecting of new genera, where necessary, will be left until later. However, where species can definitely be placed in a known genus, this has been done. Species have also been included here that have been received from Africa in recent years but that have not hitherto been recorded from the Ethiopian Region. Certain African mealy-bugs have not been collected since the original discovery and are therefore represented by type material only. Complete lists of the known hosts, and distribution records, will be given in a later paper.

The writer wishes to thank Dr. St. von Keler of the Zoologisches Museum, Berlin, for lending type preparations of *Ripersia glandulifera* Newst., and Dr. D. Miller, Cawthron Institute, Nelson, New Zealand, for lending preparations and material of *Dactylopius vastator* Mask., *Chaetococcus bambusae* Mask., and *Pseudococcus graminis* Mask. Mr. G. De Lotto has kindly sent material of *Pseudococcus graminis* Mask., from Kenya and given invaluable help in other ways.

THE SPECIES DESCRIBED BY W. M. MASKELL

Seven species described by Maskell are herein discussed from the Ethiopian Region of which six are regarded as valid species. The only species described originally from Africa is *Nipaecoccus graminis*, the others having been described from elsewhere and recorded from this region later. Illustrations are given of *Chaetococcus bambusae* and *Nipaecoccus graminis*, the remaining species having been illustrated already by other workers.

Antonina graminis (Maskell)

Sphaerococcus graminis Maskell, 1897, *Ent. mon. Mag.* **33** : 244.

Antonina graminis (Maskell), Fernald, 1903, *A Catalogue of the Coccidae of the World* : 121.

Antonina indica Green, 1908, *Mem. Dep. Agric. India, Ent.* **2** : 2.

Antonina indica Green, James, 1934, *Stylops*, **3** : 272.

Antonina graminis (Maskell), Zimmerman, 1948, *Insects of Hawaii*, **5** : 156.

Antonina indica Green, Mamet, 1949, *Mauritius Inst. Bull.* **3** : 9.

Antonina graminis (Maskell), Ferris, 1953, *Atlas of Scale Insects of North America*, **6** : 294.

There are few records of this grass-feeding species from the Ethiopian Region but material received in recent years suggests that it is much more widely spread than hitherto supposed. The African records have been under *A. indica* Green originally described from India and this has been synonymized with *A. graminis* Maskell by Ferris (*in* Zimmerman, 1948) where he gave a description and diagram. A further description and diagram were given by Ferris (1953) stating that the species lacked trilocular pores, contrary to his 1948 description. The later description was from material collected at Kingsville, Texas, but specimens have been examined by the writer from the same locality which show the dorsal trilocular pores clearly. Dr. H. Morrison of the U.S. Dept. Agric. Washington has kindly examined an adult of *graminis* from the Maskell collection. This specimen is apparently in poor condition but he believes that dorsal trilocular pores are present as they are likewise in the Texas material. All the African species studied have the dorsal trilocular pores in variable numbers but in certain specimens they are difficult to recognize because of the heavy sclerotization.

Chaetococcus bambusae (Maskell)

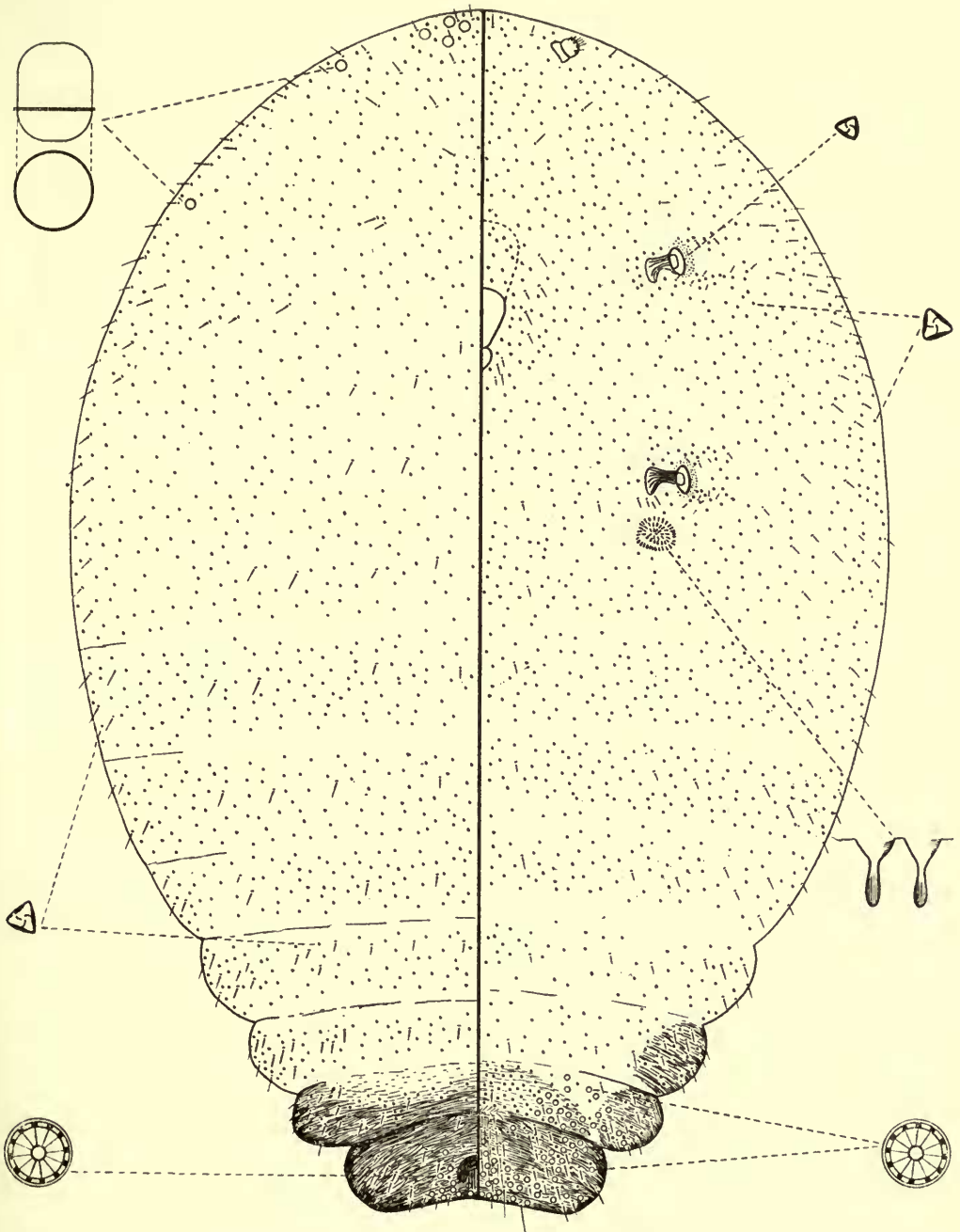
(Text-fig. 1)

Sphaerococcus bambusae Maskell, 1892, *Trans. N.Z. Inst.* **25** : 237.

Chaetococcus bambusae (Maskell), 1898, *Trans. N.Z. Inst.* **30** : 249.

Sphaerococcus bambusae Maskell, de Charmoy, 1899, *Proc. Soc. Amic. Sci.* : 48.

Antonina bambusae (Maskell), Mamet, 1949, *Mauritius Inst. Bull.* **3** : 8.



TEXT-FIG. 1. *Chaetococcus bambusae* (Maskell)

This species was originally described from Hawaii and has since been recorded from various parts of the world on bamboo. Specimens from the Ethiopian Region are at hand from Dakar, Senegal collected by J. Risbec and from Amani, Tanganyika and the species has been recorded from Mauritius. The following description and the diagram are based mainly on young adult females collected by E. M. Ehrhorn in Hawaii.

HABIT. A large conspicuous species on the leaf sheath of bamboo and surrounded by a secretion of white wax.

RECOGNITION CHARACTERS. Body of adult female turbinate each abdominal segment reduced in width posteriorly so that the abdomen tapers characteristically. In the old adults the body becomes so heavily sclerotized that it is impossible to recognize the microscopic characters. Mature specimens attaining a length of 6 mm., it becoming a large species. Antennae reduced to two or three segments, the distal segment bearing numerous setae. Legs entirely absent. Anal ring with six setae borne at the inner end of a shallow tube. Circulus absent. Dorsal ostioles lacking. Dorsal surface with at least the two posterior segments sclerotized even in the very young adults. Setae sparse, of various lengths but all short and slender, more numerous around the margins. Multilocular disc pores on the terminal abdominal segment only, situated about the area lateral and posterior to the anal tube, numbering about twenty pores altogether. Trilocular pores rather numerous and evenly distributed except on the posterior segment where they are sparse and accompany the multilocular pores. Around the anterior margins are tubular pores which are a little larger in diameter than the multilocular pores, the external part of each pore being in the shape of a shallow dome. These pores vary in number, there being only two present in some specimens whilst other specimens have up to fifteen where they are more numerous on the anterior margin and often reach posteriorly to the thorax. Dorsal tubular ducts absent. Simple circular pores scattered over the surface in no definite arrangement.

Ventral surface of the body of the young adults with posterior segments heavily sclerotized. This sclerotization develops in a characteristic manner commencing in the mid-region and the marginal areas. Setae sparse, of various lengths but all slender, more numerous around the margins and on the terminal segment where they occupy the mid-region and submarginal areas. Some of these setae, especially on the posterior margin, are longer than the others. Multilocular disc pores confined to the two posterior segments. On the terminal segment they are numerous in the mid-region, the posterior margin and the submarginal area, whilst on the penultimate segment they occupy the submarginal areas only. Trilocular pores abundant and evenly distributed except on the terminal segment where they are associated with the multilocular pores. Trilocular pores distinctly smaller than the others on the venter are situated on the spiracular plates. Small tubular ducts are present in an oval group behind each second spiracle. These ducts are funnel-shaped and heavily sclerotized. Simple circular pores distributed over surface.

NOTES. Maskell described this species in *Sphaerococcus* and later erected the genus *Chaetococcus* for it. For some time the species has been associated with the genus *Antonina*. Morrison & Morrison (1922) redescribed the genus *Chaetococcus* and also

the species *bambusae* and considered that *Chaetococcus* was doubtfully distinct from *Antonina*. Borkhsenius (1949) has recently resurrected the genus *Chaetococcus* for four species stating that it differs from *Antonina* mainly in having a group of small cylindrical pores behind the second spiracle and that the anal ring lies either on the surface or at the inner end of a shallow tube instead of a long tube as in *Antonina*. It seems possible that the genus is distinct from *Antonina* but a study of more species is desirable.

Nipaecoccus aurilanatus (Maskell)

Dactylopius aurilanatus Maskell, 1899, *Trans. N.Z. Inst.* **22** : 151.

Pseudococcus aurilanatus Fernald, 1903, *A Catalogue of the Coccidae of the World* : 97.

Pseudococcus aurilanatus Brain, 1915, *Trans. roy. Soc. S. Afr.* **5** : 107, 108.

Nipaecoccus aurilanatus Ferris, 1950, *Atlas of Scale Insects of North America*, **5** : 104.

In the Ethiopian Region this species is known from South Africa only on various species of *Araucaria*. Material has been examined from Braamfontein, Johannesburg collected by B. J. Boonzain 2.vi.23 and from Natal collected by C. Fuller. Ferris (1950) has placed this species in the genus *Nipaecoccus* Sulc and has illustrated it.

Nipaecoccus graminis (Maskell) (*comb. nov.*)

(Text-fig. 2)

Dactylopius graminis Maskell, 1891, *Trans. N.Z. Inst.* **24** : 36.

Dactylopius filamentosus small variety Cockerell, 1901, *Ent. mon. Mag.* **31** : 167.

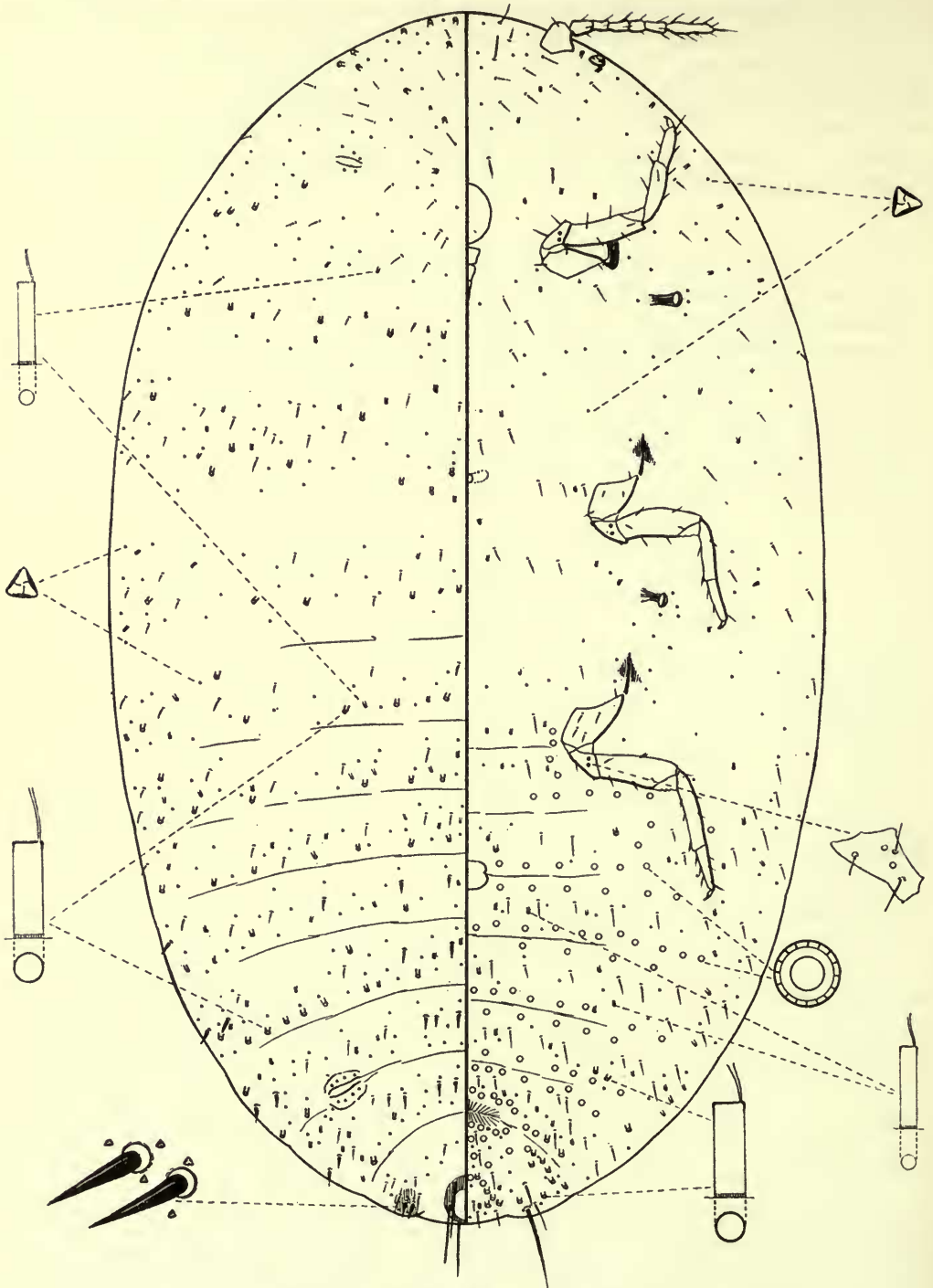
Pseudococcus natalensis Brain, 1915, *Trans. roy. Soc. S. Afr.* **5** : 100 (SYN. NOV.).

Pseudococcus graminis (Maskell), Brain, 1915, *Trans. roy. Soc. S. Afr.* **5** : 118.

Trionymus natalensis Brain, Laing, 1929, *Ann. Mag. nat. Hist.* (X), **4** : 470.

HABIT. Described by Maskell as " enclosed in a sac of white felted secretion, aggregated in masses thickly covering stems of grass ; the sacs are of irregularly elliptical form "

RECOGNITION CHARACTERS. Body of adult female blue-green at maturity this colour changing to brown during the preparation of specimens. An elongate-oval species, as mounted on the slide measuring approximately 3 mm. × 2 mm. Antennae short, seven-segmented. Legs rather short and slender with a few translucent pores on hind coxae. Trochanters very distinctive, each with an apical projection and described by Brain as shoe-shaped. Dorsal ostioles poorly developed, the anterior pair not so discernible as posterior pair, the lips of both pairs with a few trilocular pores but apparently without setae. Anal ring with six setae which are slightly longer than the ring. Dorsal surface with a reduced number of cerarii, there being only about five pairs present on the abdomen. Anal lobe cerarii composed of two stout lanceolate setae and one or two trilocular pores surrounded by a small sclerotized area. The setae comprising the other cerarii becoming more widely separated anteriorly, these of similar shape to those on anal lobes and without the cluster of trilocular pores. Dorsal setae not numerous. On the mid-region of the posterior abdominal segment they are stoutly lanceolate and of a similar shape and size to



TEXT-FIG. 2. *Nipaecoccus graminis* (Maskell).

those of the cerarii. Other setae slender and of various sizes but all small. Dorsal multilocular disc pores absent. Tubular ducts of two sizes, rather sparse, the most numerous being rather large and situated in more or less single transverse rows on the head, thorax and anterior abdominal segments. On the seventh and eighth segments a few are located on the margins whilst they are absent on the ninth segment. Smaller tubular ducts interspersed with the larger type but these are sparse on the head. They tend to replace the larger ducts on the seventh and eighth segments and are absent on the ninth segment. Trilocular pores very few and evenly distributed.

Ventral surface of the body with a pair of anal lobe setae, longer and stouter than anal ring setae. Other setae few, slender but tending to be longer than those on dorsal surface. Multilocular disc pores on abdomen only arranged in single transverse rows on the anterior and posterior edges of the segments except the second to fourth segments where they mainly occupy the posterior edges. There is a group of about twenty disc pores posterior to the vulva and others are present in the submarginal zones. Large tubular ducts similar to the large type on the dorsum, few in number, there being one or two in the mid-region of the fourth segment, a group of two or three near the margin of seventh and eighth segments. They are most numerous just anterior and between the anal lobes. The small type is very sparse, a few being present on the head and thorax and others are present on the abdomen in single transverse rows and in a submarginal zone. Trilocular pores few and scattered. Simple circular pores apparently absent.

NOTES. This species seems to be a typical *Nipaeococcus* in possessing anal lobe cerarii with two conical setae and with three to four pairs of abdominal cerarii each with a pair of widely separated conical setae devoid of trilocular pores. The setae on the posterior dorsal segments are also similar to those of the cerarii. As pointed out by Brain in his description of *natalensis* the species is easily characterized by the peculiar trochanters, each of which has an apical projection.

Through the kindness of Dr. D. Miller of the Cawthron Institute, Nelson, New Zealand, it has been possible to see type material of *graminis*. An examination of type material of *Pseudococcus natalensis* Brain shows that this is the same as *graminis*. According to Brain (1915) the species mentioned by Cockerell (1901) as *Dactylopius filamentosus* small variety is also to be referred to *natalensis*. Some excellent specimens have kindly been given by Mr. G. De Lotto from Nairobi, Kenya, and the diagram shown herewith is based on this material. The species has been described from Natal under *graminis* and *natalensis* and it has been recorded from Uganda under *natalensis* by Laing (1929).

Nipaeococcus nipae (Maskell)

Dactylopius nipae Maskell, 1892, *Trans. N.Z. Inst.* **25** : 230.

Pseudococcus nipae (Maskell), Fernald, 1903, *A Catalogue of the Coccidae of the World* : 107.

Pseudococcus nipae (Maskell), Brain, 1915, *Trans. roy. Soc. S. Afr.* **5** : 102.

Pseudococcus nipae (Maskell), Hall, 1937, *Trans. R. ent. Soc. Lond.* **86** : 128.

Nipaeococcus nipae (Maskell), Sulc, 1945, *Acta. Soc. Sci. nat. Morav.* **17** : 1-48.

Nipaeococcus nipae (Maskell), Ferris, 1950, *Atlas of Scale Insects of North America*, **5** : 109.

Brain (1915) has recorded this species from Cape Province, Natal and Transvaal on cultivated palms. Specimens have been examined from Salisbury, Southern Rhodesia, collected by W. J. Hall on *Chamaerops excelsa*. The species has been adequately described and illustrated by Ferris (1950).

Nipaecoccus vastator (Maskell)

Dactylopius vastator Maskell, 1894, *Trans. N.Z. Inst.* **27** : 74.

Dactylopius viridis Newstead, 1894, *Ind. Mus. Notes*, **3** : 25 (SYN. NOV.).

Dactylopius vastator Maskell, de Charmoy, 1899, *Proc. Soc. Amic. Sci.* : 45.

Pseudococcus viridis (Newstead), Fernald, 1903, *A Catalogue of the Coccidae of the World* : 112.

Pseudococcus perniciosus Newstead & Willcocks, 1910, *Bull. ent. Res.* **1** : 2.

Pseudococcus filamentosus Cockerell, Brain, 1915, *Trans. roy. Soc. S. Afr.* **5** : 99 (misidentification).

Pseudococcus hymenocleae Cockerell, Newstead, 1917, *Bull. ent. Res.* **8** : 127 (misidentification).

Pseudococcus perniciosus var. Newstead, 1920, *Bull. ent. Res.* **10** : 178, 179.

Pseudococcus filamentosus var. *corymbatus* Green, 1922, *The Coccidae of Ceylon*, **5** : 379 (SYN. NOV.).

Pseudococcus perniciosus Newstead & Willcocks, James, 1933, *Bull. ent. Res.* **24** : 435.

Trionymus sericeus James, 1936, *Trans. R. ent. Soc. Lond.* **35** : 203 (SYN. NOV.).

Pseudococcus filamentosus Cockerell, Hall, 1937, *Trans. R. ent. Soc. Lond.* **86** : 126 (misidentification).

Pseudococcus vastator (Maskell), Zimmerman, 1948, *Insects of Hawaii*, **5** : 245.

Nipaecoccus vastator (Maskell), Ferris, 1950, *Atlas of Scale Insects of North America*, **5** : 103.

Ferris (*in* Zimmerman, 1948) has already drawn attention to the confusion existing in the literature of erroneous records of *filamentosus* throughout the world when, so far as is known, this species is confined to North America. The main cause of the confusion was the Fernald Catalogue and its listing in error of *vastator* as a synonym of *filamentosus*, the two species being quite distinct. Ferris has already pointed out that *perniciosus* is a synonym of *vastator*. It is the opinion here that all African material identified as *filamentosus* and *perniciosus* represents the same species re-described by Ferris (*in* Zimmerman, 1948) as *vastator*. An examination of the type material of *vastator*, described from Hawaii, has been made, this having been lent through the kindness of Dr. D. Miller, Cawthron Institute, New Zealand.

Many specimens have been examined from material collected in Africa and the Indian Region. Illustrations of *vastator* have been given by Ferris (*in* Zimmerman, 1948) from Hawaiian material and also by Ferris (1954). The ventral tubular ducts have been described as of one size whereas, in fact, these ducts are of two sizes, one being slightly shorter and about half the diameter of the other. Material at hand collected by Ehrhorn in Hawaii shows this distinctly as does the type material. There is considerable variation in all the material seen, the most notable differences being the number of multilocular disc pores around the ventral margins. On one side there are up to 50 of these pores in the type material of *vastator* but in other material there are upwards of 200 pores with a corresponding increase in the number of tubular ducts. This wide variation, however, with all the intermediate forms, is present in specimens from both Africa and the Indian Region and there are no definite characters which warrant their separation into different species. Ferris was correct, therefore, in synonymizing *perniciosus*, described from Egypt, with

vastator. Type material of *corymbatus* Green from Ceylon and also type material of *viridis* Newstead described from India come within this range and both species are here sunk as synonyms of *vastator*. Mr. De Lotto has studied *Trionymus sericeus* James and has recently illustrated this when redescribing the James species (in press). There is a relatively large number of the ventral multilocular disc pores in this species but as it comes within the range of variation it is necessary that *sericeus* be reduced to a synonym of *vastator*, a decision with which Mr. De Lotto is in accord. Mr. De Lotto also agrees with the other synonymy above and it is hoped that the foregoing will help to clarify the position until such times as biological evidence is forthcoming which may prove otherwise.

There is a point of nomenclature which is of interest here. It has been impossible to ascertain the correct date of publication of the species described by Newstead as *Dactylopius viridis* in the *Indian Museum Notes*, 3, No. 5 : 25, 1894. There is a printers' date on the final page of this part given as the 14th November, 1894, but the paper is listed in the *Zoological Record* under 1895. The Maskell species described as *Dactylopius vastator* was published in the *Transactions of the New Zealand Institute*, 1894, 27 : 74 with a note at the beginning of the paper that it was read before the Wellington Philosophical Society on the 14th November, 1894. This paper was actually issued in May, 1895. Should the description of the Indian species be found to be published before the description of *vastator* then *viridis* must take priority but until then the writer would prefer to use *vastator* as this name has now become widely established.

***Pseudococcus calceolariae minor* (Maskell) = *Planococcus citri* (Risso)**

Dactylopius calceolariae var. *minor* Maskell, 1896, *Trans. N.Z. Inst.* 29 : 322.

Pseudococcus calceolariae var. *minor* (Maskell), Fernald, 1903, *A Catalogue of The Coccidae of the World* : 99.

Described originally from Mauritius on "roots of onion grass", this species is now known to be a synonym of *Planococcus citri* (Risso) and, therefore, it will not be discussed further in this work.

THE SPECIES DESCRIBED BY T. D. A. COCKERELL

Two of the six species discussed here are shown to have been misidentified in the past. These are the records of *Pseudococcus hymenocleae* and *Pseudococcus filamentosus*. The other four species are widely distributed and have been illustrated elsewhere.

***Dysmicoccus brevipes* (Cockerell)**

Dactylopius brevipes Cockerell, 1893, *Entomologist*, 26 : 267.

Pseudococcus brevipes (Cockerell), Fernald, 1903, *A Catalogue of The Coccidae of the World* : 98.

Pseudococcus bromeliae (Bouché), Brain, 1915, *Trans. roy. Soc. S. Afr.* 5 : 109.

Pseudococcus crotonis Green, 1916, *Bull. ent. Res.* 6 : 375 (misidentification).

Pseudococcus cannae Green, 1934, *Stylops*, 3 : 162 (SYN. NOV.).

Pseudococcus brevipes (Cockerell), Mamet, 1941, *Bull. ent. Res.* 32 : 57.

Pseudococcus cannae Green, Mamet, 1949, *Mauritius Inst. Bull.* 3 : 13.

Dysmicoccus brevipes (Cockerell), Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 59.

This species is probably distributed throughout Africa on various hosts although it is more widely known as a pest of pineapple. It has been described and illustrated by Ferris (1950) but mention may be made here of some characteristic pores which were presumably missing in the specimens seen by Ferris. An examination of numerous specimens from all parts of the world has shown that on the dorsal surface just anterior to the anus there is a variable number of disc pores which are intermediate in size between the trilocular and multilocular disc pores. Some specimens, however, are lacking these disc pores but this condition seems to be the exception.

Mamet (1949) has recorded *Pseudococcus cannae* Green from Mauritius but there is no reason to recognize this species as distinct from *brevipes*. Green (1934) described this species from Ceylon stating that it differs from *brevipes* mainly in possessing more slender legs and antennae. These are variable characters, however, and *cannae* comes well within the range of variation of *brevipes* throughout the world.

Ferrisiana virgata (Cockerell)

Dactylopius virgata Cockerell, 1893, *Entomologist*, **26** : 178.

Dactylopius virgatus (Cockerell), de Charmoy, 1899, *Proc. Soc. Amic. Sci.* : 44.

Pseudococcus virgatus (Cockerell), Fernald, 1903, *A Catalogue of The Coccidae of the World* : 111.

Pseudococcus virgatus var. *madagascariensis* Newstead, 1908, *Quart. J. Inst. Comm. Res. Trop., Lpool.* **3** : 9.

Dactylopius (*Pseudococcus*) *virgatus* var. *madagascariensis* Newstead, 1911, *Mitt. zool. Mus. Berl.* (V) **2** : 166.

Dactylopius (*Pseudococcus*) *virgatus* var. *madagascariensis* Newstead, 1913, *Trans. R. ent. Soc. Lond.* : 523.

Dactylopius (*Pseudococcus*) *virgatus* var. *madagascariensis* Newstead, Lindinger, 1913, *Jb. hamburg, wiss. Anst.* **30** : 68.

Pseudococcus virgatus (Cockerell), Brain, 1915, *Trans. roy. Soc. S. Afr.* **5** : 133.

Pseudococcus virgata (Cockerell), Newstead, 1917, *Bull. ent. Res.* **8** : 127.

Ferrisia virgata (Cockerell), James, 1933, *Bull. ent. Res.* **24** : 435.

Ferrisiana virgata (Cockerell), Colizza, 1933, *Boll. Soc. ent. ital.* : 65-66.

Ferrisia virgata (Cockerell), Hall, 1943, *J. ent. Soc. S. Afr.* **6** : 5.

Ferrisia virgata (Cockerell), Mamet, 1949, *Mauritius Inst. Bull.* **3** : 9.

Ferrisiana virgata (Cockerell), Ferris, 1950, *Atlas of Scale Insects of North America*, **5** : 93.

Ferrisia virgata (Cockerell), Mamet, 1951, *Mém. Inst. sci. Madagascar*, **5** : 215.

The above list represents all the African records to date. This is possibly one of the commonest mealy-bugs in Africa and will probably be found throughout the continent on many hosts. Mamet (1951) has recently synonymized the variety *madagascariensis* Newst. with *virgata*.

Planococcus lilacinus (Cockerell)

Pseudococcus lilacinus Cockerell, 1905, *Proc. Davenport Acad. Sci.* **10** : 128.

Tylococcus mauritiensis Mamet, 1939, *Trans. R. ent. Soc. Lond.* **5** : 89.

Planococcus lilacinus (Cockerell), Ezzatt & McConnell, 1956, *Univ. Maryland Agric. Exp. Sta. Bull.* A-84 : 89-93.

It has already been noted by Le Pelley (1943) that confusion has existed in records of *Pseudococcus lilacinus* Cockerell in East Africa on coffee when the species involved

is now known as *Planococcus kenyae* (Le Pelley). So far as is known *P. lilacinus* has never been collected on the African continent but material is at hand from Mauritius and Madagascar, the former kindly made available by Dr. R. Mamet. The species has recently been discussed in detail and illustrated by Ezzatt & McConnell (1956).

***Pseudococcus filamentosus* Cockerell**

A discussion of this species and its records in Africa will be found herein under *Nipaecoccus vastator* (Maskell). The species has been shown by Ferris (1950) to be of North American distribution only and that the other records throughout the world are open to question.

***Pseudococcus hymenocleae* Cockerell**

Pseudococcus hymenocleae Cockerell, Newstead, 1917, *Bull. ent. Res.* 8 : 127.

Newstead recorded this species from South Africa in 1917 but an examination of his material shows that this was misidentified. The specimens are, in fact, *Nipaecoccus vastator* (Maskell) discussed elsewhere in this work.

***Saccharicoccus sacchari* (Cockerell)**

Dactylopius sacchari Cockerell, 1895, *J. Trinidad Field Nat. Club*, 2 : 195.

Dactylopius sacchari Cockerell, de Charmoy, 1899, *Proc. Soc. Amic. Sci.* : 45.

Pseudococcus sacchari (Cockerell) Brain, 1915, *Trans. roy. Soc. S. Afr.* 5 : 127.

Trionymus sacchari Cockerell, Hall, 1937, *Trans. R. ent. Soc. Lond.* 86 : 134.

Trionymus sacchari Cockerell, Mamet, 1949, *Mauritius Inst. Bull.* 3 : 17.

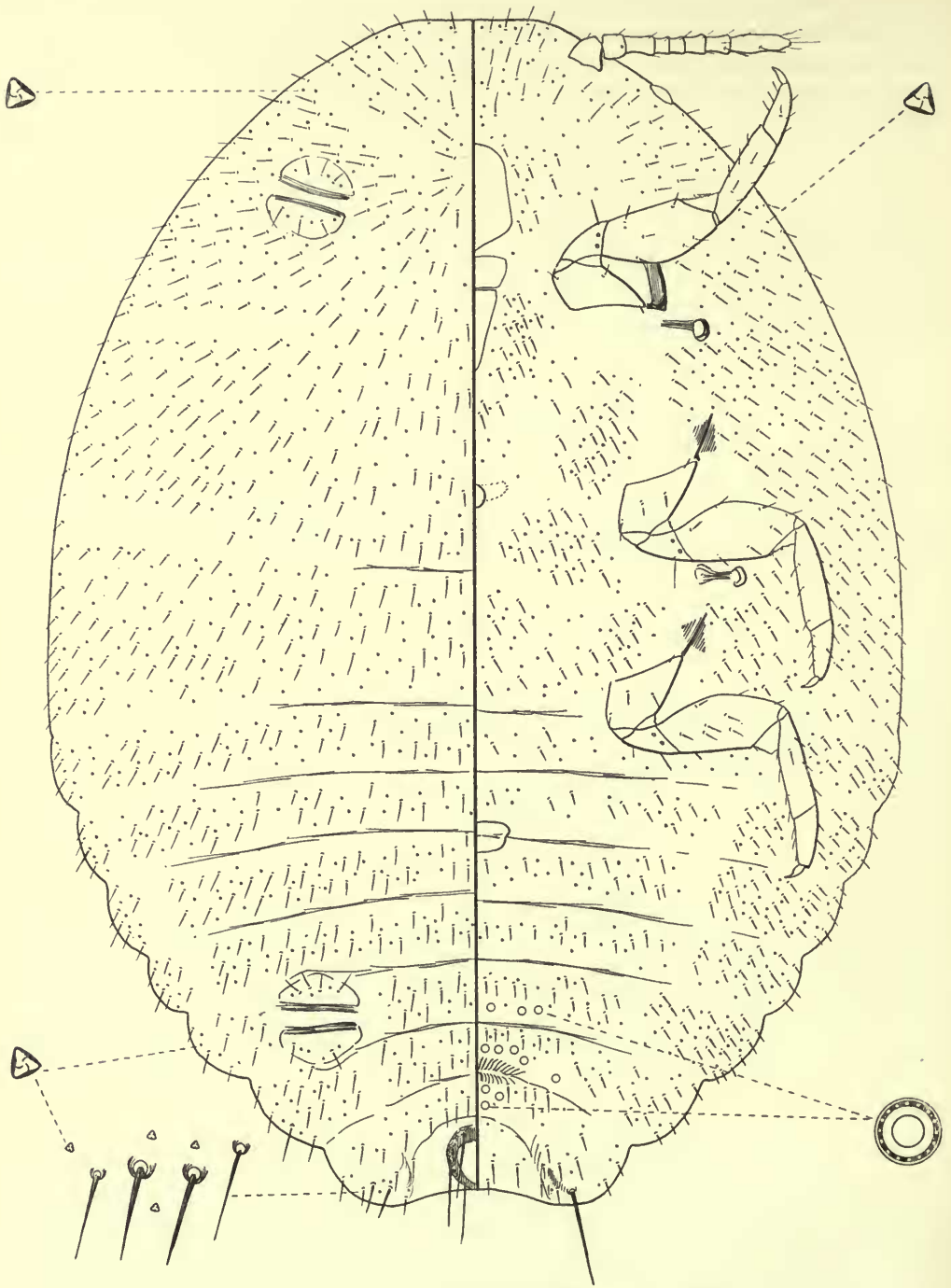
Saccharicoccus sacchari (Cockerell), Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 217.

Saccharicoccus sacchari (Cockerell), Mamet, 1953, *Mem. Inst. sci. Madagascar*, 3 : 11.

This species attacking sugar-cane is apparently not too widely spread in Africa. It has been recorded from South Africa by Brain (1915), from Southern Rhodesia by Hall (1937) and from Mauritius by de Charmoy (1899) and Mamet (1949). Mamet has recently recorded the species from Madagascar. Most of the records in the past have been under *Trionymus* but the species was placed in the genus *Saccharicoccus* by Ferris (1950) where it is illustrated.

THE SPECIES DESCRIBED BY R. NEWSTEAD

At the beginning of the century Newstead had the opportunity of studying and describing a large amount of African material. Of the eight mealy-bugs described by him only four are valid species but these are rather interesting and typically African. Three of these, *Eurycoccus coccineus*, *Ripersia glandulifera* and *Tylococcus madagascariensis*, have not been collected again since the original discoveries.



TEXT-FIG. 3. *Eurycoccus coccineus* (Newstead).

Eurycoccus coccineus (Newstead) (*comb. nov.*)

(Text-fig. 3)

Dactylopius coccineus Newstead, In Sjöstedt, 1908, *Wiss. Ergeb. Schwed. Zool. Expdn. Kilimandjaro, Meru*, 1905-1906, **12** : 8, 9.

HABIT. Described from Steppe, Kiraragua, Kilimanjaro on Acacias. Newstead stated that the external covering was missing.

RECOGNITION CHARACTERS. Adult female broadly oval, as mounted on the slide 1.5 mm. × 1.2 mm. Antennae rather short, eight-segmented. Legs tending to be small, short and stout. Circulus large and divided by a transverse fold. Anterior and posterior ostioles well developed, moderately sclerotized, with three to four setae and about three trilocular pores on each lip. Anal ring with six setae, each slightly longer than the diameter of the ring. Cerarii present as a single pair on the anal lobes, each cerarius composed of two, long, slender setae, these only slightly stouter than the two or three auxiliary setae. Trilocular pores surrounding each anal lobe cerarius numbering three or four. Dorsal setae slender, of various lengths but mainly short and rather numerous. Trilocular pores evenly distributed, not numerous. Dorsal tubular ducts absent.

Ventral surface with a small area of sclerotization on each anal lobe. Anal lobe setae longer and stouter than the anal ring setae. Other setae of various lengths but mostly short and slender and more numerous in a submarginal zone. Multilocular disc pores of usual type on the seventh, eighth and ninth segments only. There are about six pores on the seventh segment, ten pores on the eighth segment, these in single transverse rows. In the available specimens there is an average total of twenty pores. Trilocular pores sparse, more numerous towards the margins. Tubular ducts absent. A few simple circular pores present in no definite arrangement.

NOTES. This species has not been collected since the original discovery. It seems to belong to the genus *Eurycoccus* as recently defined by Ferris (1950). Most of the specimens seen show the circulus folded but in one specimen the circulus is large and divided by a transverse fold. The single pair of cerarii is typical of those in the known species. The nearest species is apparently *Eurycoccus jessica* (Hollinger) described from Missouri, U.S.A. but *coccineus* differs mainly in possessing more multilocular disc pores and in lacking the ventral tubular ducts.

Paraputo anomala (Newstead) (*comb. nov.*)

(Text-fig. 4)

Ripersia anomala Newstead, In Sjöstedt, 1908, *Wiss. Ergeb. Schwed. Zool. Expdn. Kilimandjaro, Meru*, 1905-1906, **12** : 9, 10.

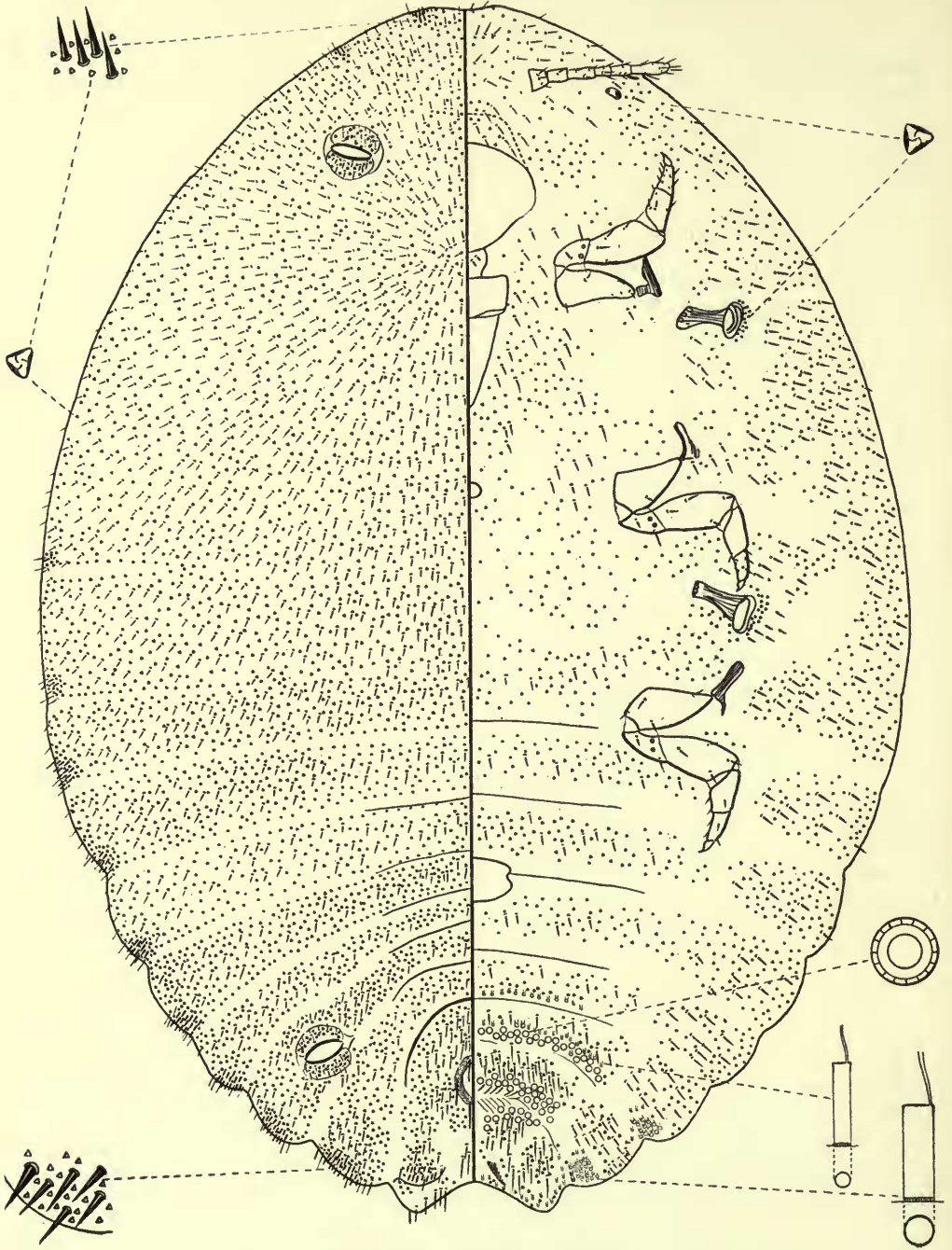
Paraputo ritchiei Laing, 1929, *Ann. Mag. nat. Hist.* (10) **4** : 473, 474 (SYN. NOV.).

Paraputo multispinosa James, 1935, *Stylops*, **4** : 233.

Paraputo ritchiei Laing, Strickland, 1947, *Bull. ent. Res.* **38** : 512, 513.

Paraputo ritchiei Laing, Ferris, 1955, *Microentomology*, **20**, : 5.

Newstead originally described this species from Kiboroto, Kilimanjaro, as living under the bark accompanied by small black ants (*Pheidole megacephala*). He stated



TEXT-FIG. 4. *Paraputo anomala* (Newstead).

that the insect resembled a species of *Dactylopius* in life. Strickland (1947) states that in life the insect is "covered with white wax, of a lumpy nature, the lumps thicker and larger at the lateral edges of the segments. With 12 pairs of lateral wax filaments". The species is illustrated and redescribed from type material of *ritchiei* the preparations of which proved more favourable.

RECOGNITION CHARACTERS. Body of adult female broadly oval, as mounted on the slide the largest specimens attaining a size of 4.5 mm. \times 4.0 mm. thus being quite a large species. Antennae short, six-segmented. Legs short and stout, the posterior coxae with a few translucent pores. Circulus present, well developed. Anal ring situated nearly three times its length from the apex of the abdomen, with six setae all of which are about half the length of the ring. Spiracles noticeably large and heavily sclerotized. Dorsal ostioles well developed, the lips with numerous short slender setae and trilocular pores, the inner edges sclerotized. Anal lobes protruding. Dorsum with a reduced number of cerarii, these varying in number from 11 to 13 distinct pairs. There are always the frontal and pre-ocular cerarii present and cerarii are usually absent on the pro- and mesothorax. In all cases the anal lobe cerarii are each composed of about 15 short conical setae surrounded by numerous trilocular pores. The penultimate cerarii are usually the largest each containing up to 25 conical setae. Anteriorly the cerarii become smaller so that on the metathorax the conical setae may number only one or two in each cerarius surrounded by five or six trilocular pores. On the head the setae and trilocular pores comprising the cerarii are reduced in number posteriorly. Dorsal setae numerous, all short and slender, a few larger setae present on the posterior abdominal segments. Trilocular pores abundant, evenly distributed. Dorsal multilocular disc pores and tubular ducts absent.

Ventral surface of the body with a small area of sclerotization on the inner angles of each anal lobe. Ventral setae not as numerous as on dorsum, longer on the posterior abdominal segments. Short slender setae distributed over thorax and head. Multilocular disc pores confined to the mid-region of the body. A group of about 25 situated posterior to the vulva and about 50 in a transverse row on each of the first two prevulvar segments. Ventral tubular ducts of two sizes confined to the posterior abdominal segments. A larger type present in characteristic single groups of 20-30 on the margins of the seventh, and eighth segments. One or two are also present in the mid-region of the seventh segment. The smaller type situated in transverse rows on the mid-region of the sixth and seventh segments, around the groups of the larger type and on the margins of the anal lobes. Trilocular pores not so abundant as on dorsum, rather numerous around the openings of the spiracles. A few simple circular pores present in no definite arrangement.

NOTES. Strickland (1947) has already drawn attention to the variable characters of *ritchiei* to which he synonymized *multispinosa*. The types of these two species have been seen and also the type of *anomala* Newstead and it is quite evident that both *ritchiei* and *multispinosa* are synonyms of *anomala* the latter species here placed in the genus *Paraputo* which was erected for *ritchiei* by Laing. Ferris (1955) has attempted to redefine the genus *Paraputo* and to redescribe *ritchiei*. Unfortunately both descriptions were based on immature specimens of *ritchiei*,

***Pseudococcus obtusus* Newstead = *Rastrococcus iceryoides* (Green)**

This species was described from German East Africa on Baobunde and was later described from other localities in East Africa. Green (1922) synonymized it with his *iceryoides* and a further discussion is given under this name as assigned to the recent genus *Rastrococcus* Ferris.

***Pseudococcus perniciosus* Newstead & Willcocks = *Nipaecoccus vastator* (Maskell)**

Originally described from Egypt this species has been recorded by James (1933) from Kenya on coffee. It was regarded as a synonym of *Pseudococcus filamentosus* Cockerell by Hall (1925) but recently Ferris (1948) established it to be a synonym of *vastator* Maskell discussed elsewhere in this work.

***Pseudococcus perniciosus* var. Newstead = *Nipaecoccus vastator* (Maskell)**

Pseudococcus perniciosus var. Newstead, 1920, *Bull. ent. Res.* 10 : 178, 179.

This species was described by Newstead as possessing no typical abdominal cerarii except on the anal lobes and in this respect differed from typical *perniciosus*. An examination of the original material of this supposed variety shows that the cerarii are similar to typical *perniciosus* and also to *vastator* to which *perniciosus* is a synonym.

***Pseudococcus virgata* var. *madagascariensis* (Newstead)
= *Ferrisiana virgata* Cockerell**

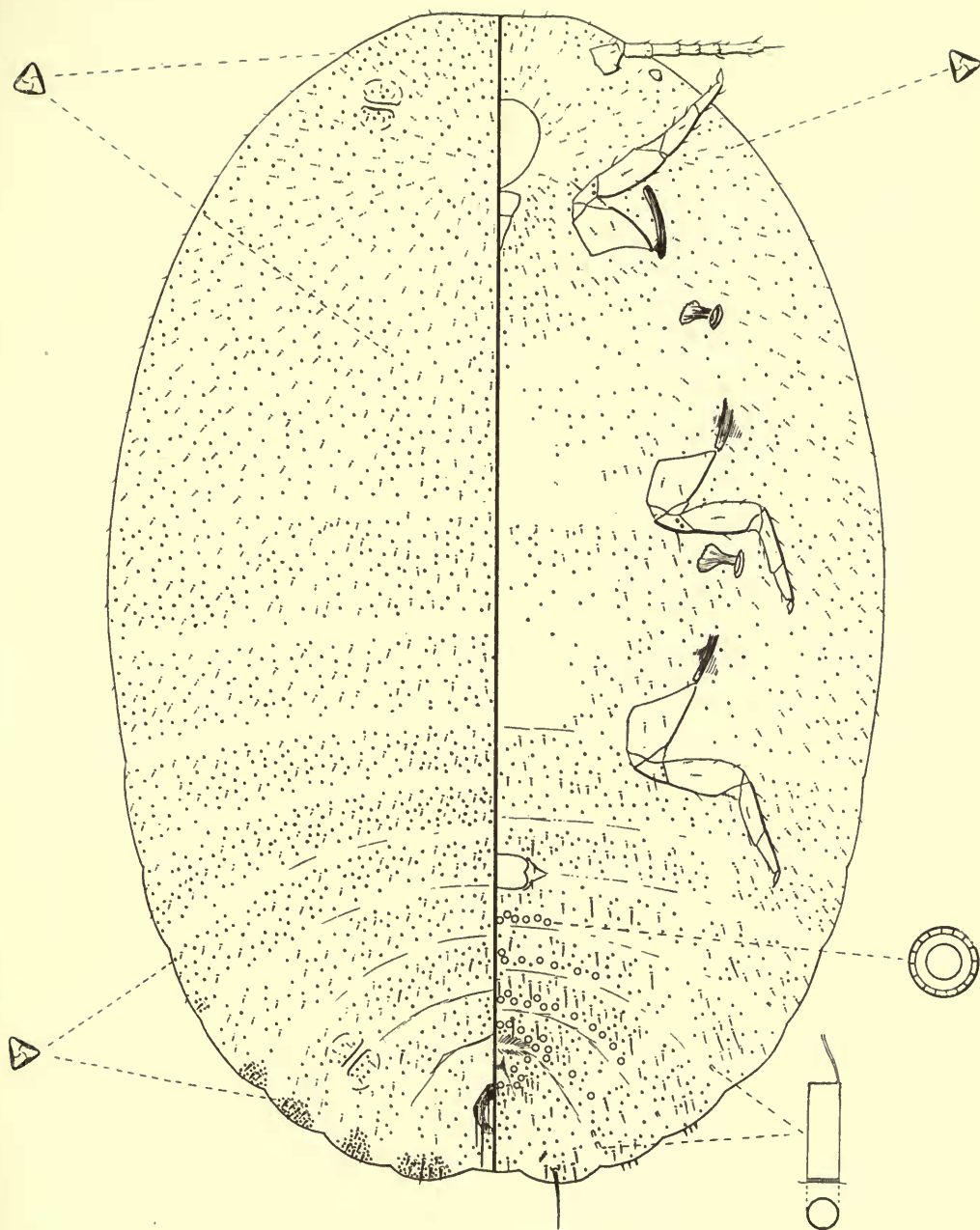
As previously stated in this work this species has been synonymized with *Ferrisiana virgata* by Mamet (1951). An examination of the types of this species from Madagascar shows that there is no justification for accepting the variety and consequently all records to this species including those by Newstead and Lindinger from Tanganyika and Newstead from Nigeria should be known under *virgata*.

***Ripersia glandulifera* Newstead
(Text-fig. 5).**

Ripersia glandulifera Newstead, 1912, *Denkschr. med.-naturw. Ges. Jena*, 17 : 17.

HABIT. Originally described from South West Africa, Klein-Namaland, Kamaggas on *Adiantum* sp. and collected by L. Schultze 1904. Apparently this is the only record. Newstead stated that no details could be given of the external covering.

RECOGNITION CHARACTERS. Adult female oval, a rather large species measuring approximately 3.4 mm. × 2.25 mm. on the slide. Antennae short, six-segmented. Legs short and slender but coxae noticeably large in proportion. Circulus present but on the two available specimens its shape cannot be determined with accuracy.

TEXT-FIG. 5. *Ripersia glandulifera* (Newstead).

Ostioles well developed with two to three setae and three to six trilocular pores on each lip. Anal ring situated about its length from the posterior end of the body, with six setae slightly longer than the diameter of the ring. Cerarii reduced in number, there being five pairs present on the abdomen. Anal lobe cerarii each composed of eight or nine setae of various sizes but all are short, stout and conical, surrounded by numerous trilocular pores. The setae and trilocular pores comprising the other cerarii are reduced in number anteriorly, each anteriormost cerarius composed of one or two setae and about six trilocular pores. Dorsal setae rather numerous, short and slender, except for a few in the mid-region of the posterior abdominal segments which are stouter and larger. Trilocular pores numerous. Dorsal tubular ducts absent.

Ventral surface with a small area of sclerotization on each anal lobe and a curved area posterior to the vulva. Anal lobe setae stout, longer than anal ring setae, each surrounded by three or four setae of moderate length. Other setae of various lengths, mainly short and slender and interspersed on the abdomen with longer and stouter setae. Multilocular disc pores confined to the mid-region of segments posterior to the circulus, arranged in transverse rows on posterior edges of the prevulvar segments and in a group of about twelve pores posterior to vulva. Tubular ducts of one size, sparse, a single duct present on the margins of the fifth, sixth and seventh segments and a marginal group of two or three on the eighth segment. Trilocular pores evenly distributed, not so numerous as on the dorsal surface.

NOTES. Through the kindness of Dr. St. von Keler of the Zoologisches Museum, Berlin, it has been possible to see two adult females of this species. These are not in very good condition so that the illustration herewith must be regarded as tentative. When describing this species Newstead gave a diagram of the second stage female and gave characters of this and the larva. Specimens have been seen which show that these are referable to a species of *Pseudococcus*, they are quite distinct from *glandulifera*.

This species seems to be a *Paraputo* but is here left in the genus *Ripersia* until such time as all the African species relating to *Paraputo* can be studied.

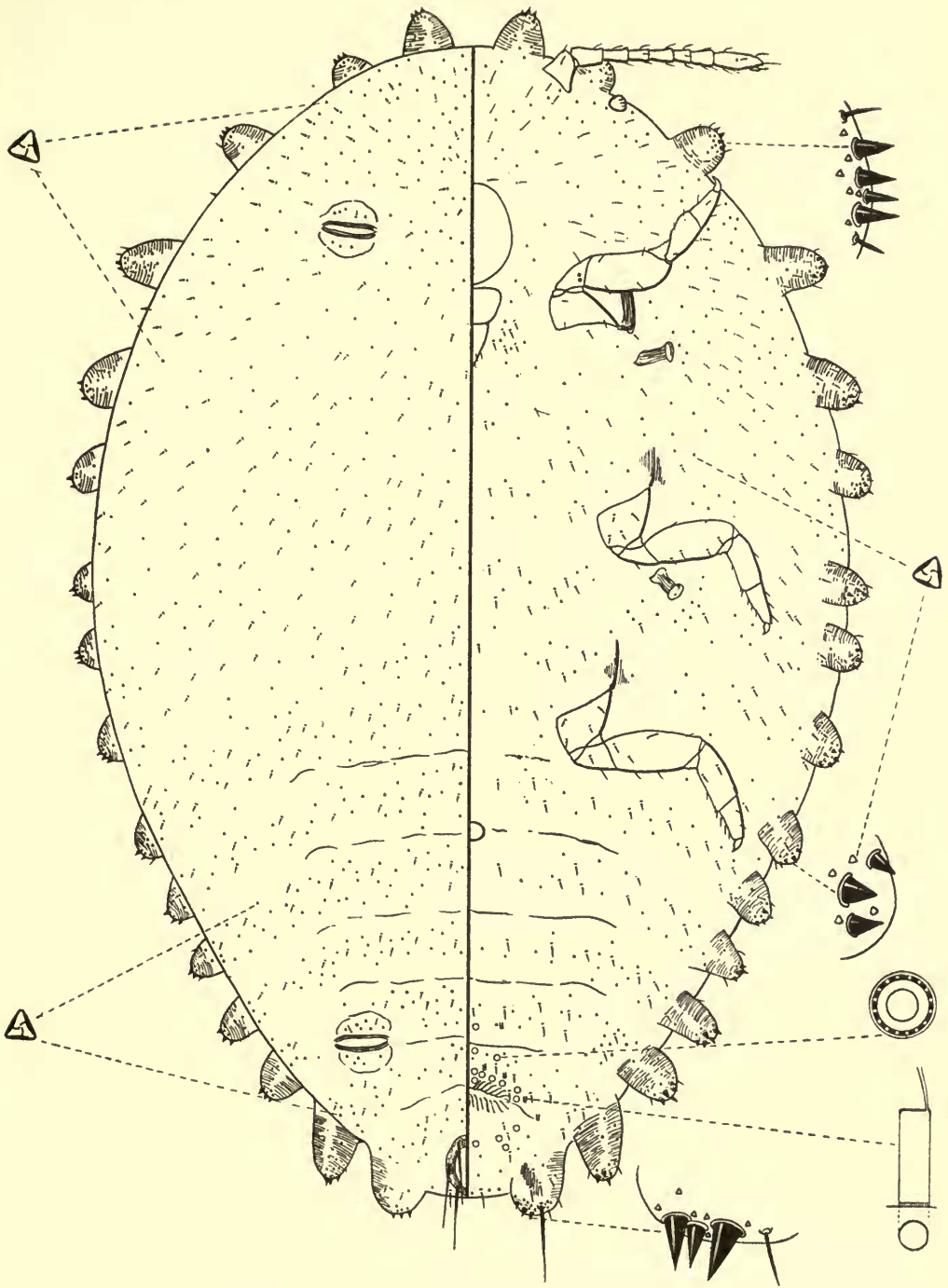
Tylococcus madagascariensis Newstead

(Text-fig. 6)

Tylococcus madagascariensis Newstead, 1897, *Ent. mon. Mag.* 33 : 166.

HABIT. Described originally from Madagascar in the nests of *Crematogaster Schenki* For. Newstead was not able to give any account of the external covering as the specimens had been preserved in alcohol. The species has apparently not been collected since the original discovery.

RECOGNITION CHARACTERS. Body of adult female ovoid, measuring approximately 2 mm. long. Antennae eight-segmented. Legs rather short and stout. Ostioles moderately developed, each lip with one or two setae and three or four trilocular pores. Anal ring with six setae which are slightly longer than the diameter of the ring. Circulus small. Cerarii numbering sixteen pairs, each cerarius borne at the



TEXT-FIG. 6. *Tylococcus madagascariensis* Newstead.

apex of a stout, sclerotized, marginal and more or less conical tubercle. These tubercles are slightly ventral in position and the cerarii are inclined to the ventral surface. Anal lobe cerarii each with three large conical setae surrounded by a few trilocular pores. The marginal tubercles are smallest on the thorax and anterior abdominal segments and the cerarii borne on these tubercles are each composed of from four to six conical setae and a few trilocular pores. The conical setae comprising the cerarii on the anterior abdominal segments and the thorax tend to be shorter and stouter than the others. A few auxiliary setae are often present with the cerarii but these are stouter than the others on the dorsal and ventral surfaces. Between some of the tubercles there is often a cerarius composed of a few slender setae and trilocular pores but these are not constant. Dorsal setae short and slender, not numerous. Trilocular pores sparse. Dorsal multilocular disc pores and tubular ducts absent.

Ventral surface of anal lobes with a pair of long anal lobe setae, these longer than the anal ring setae. Anterior to these setae there is an area of sclerotization on each lobe surrounded by about three setae. Multilocular disc pores confined to the three posterior abdominal segments, there being about three on the seventh segment and about twenty on the eighth segment arranged in two transverse rows at the anterior edges of the segment. Six to nine pores are present posterior to the vulva. Ventral tubular ducts sparse, there being but two or three in the mid-region of the seventh segment and about eight in a transverse row on the eighth segment. Trilocular pores not numerous. Ventral setae few, of various sizes but all short and slender.

NOTES. This species was originally described in the genus *Tylococcus* by Newstead and since then other species have been assigned to it. It seems possible, however, that many of these are not congeneric.

THE SPECIES DESCRIBED BY E. E. GREEN

Green described only *Ripersia longisetosa* from the Ethiopian Region but a number of his species originally described from elsewhere have now been discovered here. It is interesting to note that many which he described from the Indian Region have been collected in recent years in East Africa; an indication that others may yet be found.

Antonina indica Green = *Antonina graminis* (Maskell)

This species has been described from India and has been synonymized with *A. graminis* Maskell by Ferris (*in* Zimmerman, 1948). African records, therefore, will be found listed herein under *graminis*.

Centrococcus insolitus (Green)

Phenacoccus nivalis (Maskell), de Charmoy, 1899, *Proc. Soc. Amic. Sci.* : 42 (misidentification).

Phenacoccus insolitus Green, 1908, *Mem. Dep. Agric. India, Ent.* 2 : 25.

Phenacoccus insolitus Green, Newstead, 1911, *Mitt. zool. Mus. Berl.* (V) 2 : 164.

Tylococcus insolitus (Green), Brain, 1915, *Trans. roy. Soc. S. Afr.* 5 : 95.

- Phenacoccus insolitus* Green, 1922, *The Coccidae of Ceylon*, 5 : 390.
Phenacoccus insolitus Green, James, 1934, *Stylops*, 3 : 272.
Phenacoccus insolitus Green, Mamet, 1949, *Mauritius Inst. Bull.* 3 : 11.
Phenacoccus insolitus Green, Mamet, 1950, *Mém. Inst. sci. Madagascar*, 4 : 21.
Centrocooccus insolitus (Green), Ferris, 1954, *Microentomology*, 19 : 54.

Originally described by Green from India on *Sida cordifolia* as having numerous erect hair-like glassy filaments. Recorded by Newstead on *Tabernaemontana* from Tanganyika and by James from Kenya on *Sida rhombifolia*. Brain recorded this species under *Tylococcus* from Cape Province, South Africa on *Hibiscus*. It has been recorded by Mamet on various hosts in Mauritius and he has recently recorded it from Madagascar. Ferris (1954) has discussed and illustrated this species and placed it in the genus *Centrocooccus* Borkhsenius.

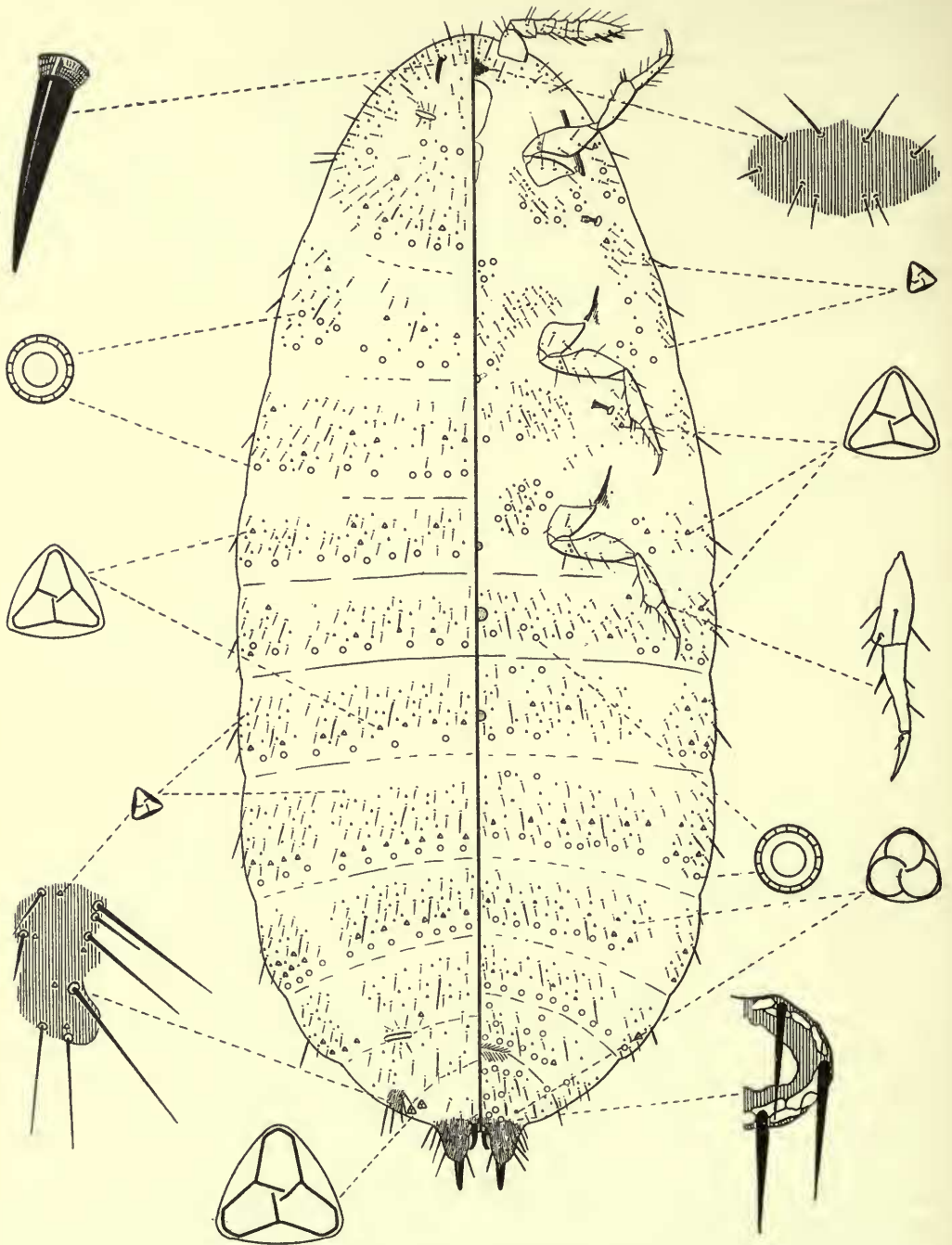
Geococcus coffeae Green

(Text-fig. 7).

- Geococcus coffeae* Green, 1933, *Stylops*, 2 : 54.
Geococcus coffeae Green, Strickland, 1947, *Bull. ent. Res.* 38 : 502.

HABIT. Originally described from Dutch Guiana from "the coffee tree (*C. liberica*)". Recorded by Strickland (1947) from Gold Coast on the roots of *Theobroma cacao*, *Canna indica*, *Coffea arabica* and *Desplatzia dewevrei*. The habit of this species was not described by Green in his original description but Strickland described the habit in Africa as follows : "the insects form small cells, lined with white wax along the rootlets on which they are feeding". The following description of the species is based on the type material, the specimens recorded by Strickland and on the following : Gold Coast, from soil, collected by W. Bellfield ; Ibadan, Nigeria, on the roots of *Canna indica*, collected by R. G. Donald and Zanzibar on the roots of clove, collected by M. J. Way.

RECOGNITION CHARACTERS. Body of adult female elongate-oval, the length of the older specimens attaining 2.5 mm. Antennae geniculate, six-segmented, the distal segment bearing a pair of stout, blunt setae. Legs small and slender, the distal end of tibia being noticeably wide. Claws long and slender, each bearing a pair of short, setose digitules at the base. Circuli three in number, situated on the second, third and fourth segments. They are rather small and convex, each with a reticulated surface, the anterior circulus being the smallest and the middle circulus being the largest. Dorsal ostioles well developed with the inner edges of the lips heavily sclerotized. Anal lobes heavily sclerotized and fused at the bases, each bearing at the apex a stout spine-like process nearly as long as a lobe. Between the bases of the lobes there is another pair of curved, blunt spine-like processes on the dorsal surface which are smaller than those on the apices of the lobes. A straight pair of similar processes is also present on the head, these set close together and situated just behind the antennae. The position of the spine-like processes between the anal lobes tends to push the anal ring to the ventral surface which always lies in this position on mounted specimens. Anal ring with six setae, the anterior pair being

TEXT-FIG. 7. *Geococcus coffeae* Green.

the shortest and most slender whilst the lateral pair is rather stout and longer than the others. The derm of the body tends to become more heavily sclerotized in the older females especially on the posterior abdominal segments and the head region which often masks the pore characters. Dorsal surface with cerarii entirely lacking. Setae of various lengths, rather numerous. On the posterior marginal angle of the ninth segment there are about five long setae and one or two smaller setae surrounding a more or less quadrate sclerotized area. Other long setae are present singly on the margins of the segments and about five to seven lie in transverse rows across each segment. The remaining dorsal setae are short and slender. Multilocular disc pores present on the head, thorax and posteriorly to the sixth abdominal segment, these lying in single transverse rows on the posterior edges of the segments. Trilocular pores interspersed with the setae, not numerous. Tritubular pores of two sizes, the most numerous having a single loculus about the same size as a trilocular pore, lying on all segments posterior to the seventh abdominal segment where they are situated in single transverse rows just anterior to the multilocular pores. On the sixth and seventh segments there are usually some marginal groups of five or six. Larger tritubular pores are present in numbers of two to four on the margins of the ninth abdominal segment and occasionally there is one on each margin of the eighth segment. In some specimens these pores are noticeably larger than the other dorsal tritubular pores whilst in other specimens they are of a similar size.

Ventral surface with an ill-defined sclerotized area between the antennal bases beset with about eight marginal setae. Ventral setae of various lengths similar to those on the dorsum. A few long setae on the anal lobes and on the ninth segment. Other long setae in transverse rows of about four to six on the abdominal segments and in the mid-region between the coxae and antennae. More numerous smaller setae are present on all segments. Multilocular disc pores on the abdomen in transverse single rows on the posterior edges of the segments. A few on the anterior edges of some of the anterior abdominal segments and on the first prevulvar segment. A group of about sixteen present on the ninth segment. Other multilocular disc pores in the mid-region between and lateral to the coxae. Trilocular pores in similar numbers to those on the dorsum, sparse on the posterior segments. Tritubular pores of two sizes. One type similar to the smaller on the dorsal surface distributed as follows: there is a single pore usually present posterior to each spiracle and one or two on the head and thorax among the groups of setae. On the third, fourth and fifth segments there are usually a few anterior to the multilocular disc pores and on the margins. Posteriorly there is only a pair or so to each of the remaining prevulvar segments. A smaller type of tritubular pore with round loculi is present in single transverse rows on the sixth and seventh segments and a pair is usually present on the ninth segment anterior to the anal lobes. These pores are about the same size as a multilocular disc pore. In some specimens they may be replaced on the sixth segment by the larger type. Tubular ducts entirely absent.

NOTES. Some doubt was entertained by Green as to whether he was describing immature or adult specimens. Of the three specimens available from the type material two are adults and one is immature. Specimens from the penultimate instar differ mainly in possessing but two circuli instead of three as in the adult.

The distribution of the tritubular ducts seems to be somewhat variable. On the sixth ventral abdominal segment of the Gold Coast specimens the tritubular pores are of the larger variety but in other specimens examined including the type they are of the smaller variety with round loculi.

The identification of this species seems to have been confused in many cases with *Geococcus radicum* described by Green (1902) from Pundaluoya, Ceylon, on grass roots. The latter differs from *coffear* in lacking the pair of spines between the anal lobes and possessing differently shaped tritubular pores. These have been figured by Green (1902, fig. 3b), the loculi being mainly oval in shape and lying sideways to the radii. In *coffear* the main tritubular pores have the loculi radiating lengthwise from the centre. Green (1922) recorded *radicum* from Kandy, Ceylon, and labelled this material immature. In fact this material is identical with his adult *coffear* described from Dutch Guiana although he noted in his description of the latter that it differed from the immature specimens of *radicum* (the Kandy material) in having the anal lobes more heavily sclerotized. This sclerotization varies with the specimens and is of little importance.

There are, however, some first-stage larvae with the type material of *radicum* and there are at hand some first-stage larvae of the Gold Coast specimens here regarded as *coffear*. The spine-like processes at the apices of the anal lobes differ greatly in size in the two species. In *radicum* they measure $\cdot 034$ mm. \times $\cdot 004$ mm. and in the Gold Coast specimens they measure $0\cdot 028$ mm. \times $\cdot 01$ mm. Furthermore in each species there is a pair of dorsal tritubular pores opposite the posterior coxae. In *radicum* these pores resemble those of the adult and in the Gold Coast specimens they also resemble the main dorsal pores of the adult herein illustrated under *coffear*. As already stated the pores of both species are different, the first stage larvae of both species being, therefore, quite distinct. The position now seems to be clear that the specimens collected by Green at Kandy, Ceylon are adults of *coffear* and not immature specimens of *radicum*. As many records of *radicum* throughout the world seem to have been based on the so-called immature form it is evident that many of these should be referred to as *coffear*.

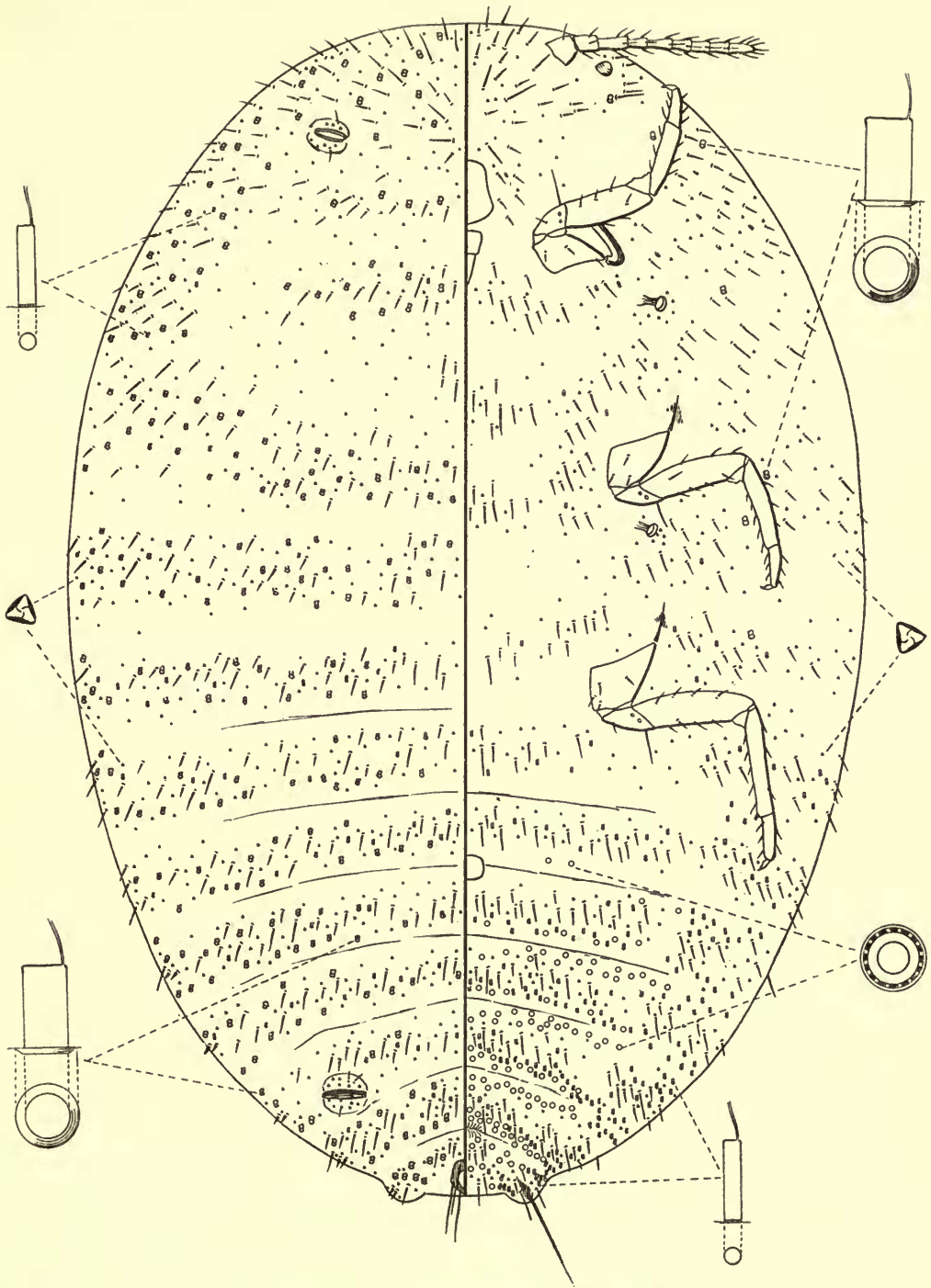
Phenacoccus hirsutus Green

(Text-fig. 8)

Phenacoccus hirsutus Green, 1908, *Mem. Dep. Agric. India, Ent.* 2 : 25.

HABIT. Described originally from India on an unknown shrub attended by ants (*Crematogaster rogenhoferi*) this species is now known to occur throughout the Indian Region and South East Asia. It is apparently established throughout the Middle East where it is known, especially in Egypt, on numerous hosts as the Hibiscus Mealy-bug often doing considerable damage. Specimens are at hand from numerous localities and hosts in Sudan. The species has been recorded as reddish in colour and sparsely covered with white mealy wax.

RECOGNITION CHARACTERS. Adult female ovoid, as mounted on the slide measuring approximately 3 mm. \times 1.5 mm. Antennae nine-segmented. Legs slender of



TEXT-FIG. 8. *Phenacoccus hirsutus* Green.

moderate length, denticle on claw absent. Circulus small. Ostioles with a chitinized bar on the inner edge of each lip, and with one or two setae and a few trilocular pores. Anal ring with six setae which are a little longer than ring. Cerarii on the posterior five abdominal segments only. Anal lobe cerarii each composed of a pair of short conical setae and one or two trilocular pores. Anterior cerarii with two setae and rarely with trilocular pores. Dorsal setae numerous of various sizes but all slender. Dorsal multilocular disc pores absent. Tubular ducts of two sizes. Numerous large ducts of the oral rim type are distributed across each segment and small ducts each without an oral rim are located among the larger ducts but these are few in number. Trilocular pores sparse.

Ventral surface with a pair of long anal lobe setae which are about twice as long as anal ring setae. There is a narrow sclerotized bar extending from the base of each anal lobe seta. Ventral setae rather numerous of various sizes but all slender. Multilocular disc pores confined to the abdomen on the anterior and posterior edges of the segments posterior to the circulus. They tend to be more numerous at the anterior edges. Occasionally there are one or two pores on the first segment anterior to the circulus. Tubular ducts each with an oral rim and similar to those on dorsum, few in number and situated in a submarginal zone on the head and thorax. Small tubular ducts without the oral rim, numerous on posterior margins and lateral margins of the abdominal segments. They are sparse on the head and thorax. Trilocular pores few in number.

NOTES. Apart from the nine-segmented condition of the antennae this species has little to do with the genus *Phenacoccus*. The absence of the claw denticles, the presence of a sclerotized bar on each anal lobe and oral rim tubular ducts on the dorsal and ventral surfaces show close affinities to the genus *Paracoccus* Ezzatt & McConnell placed in the tribe Planococcini.

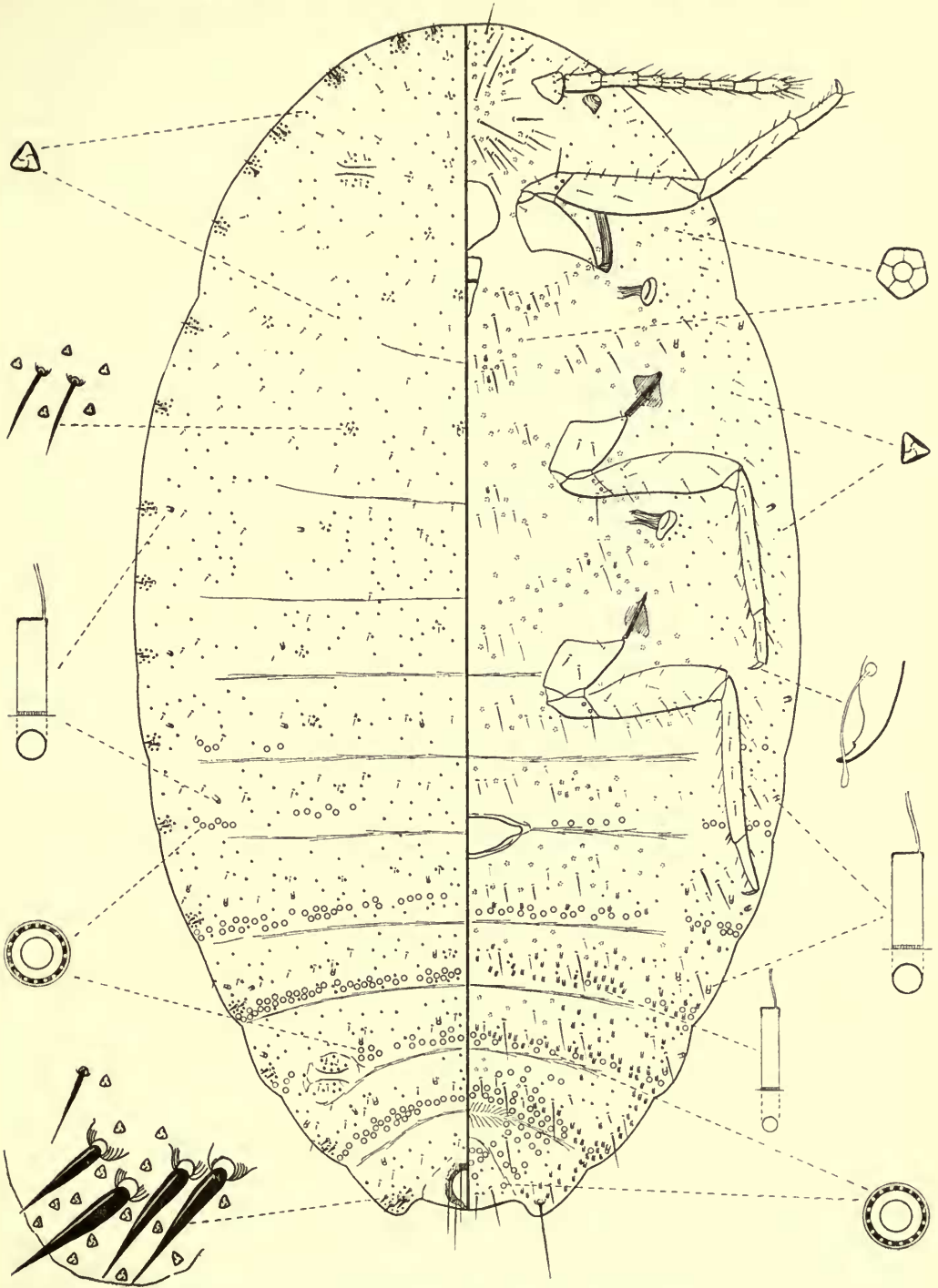
Phenacoccus madeirensis Green

(Text-fig. 9)

Phenacoccus madeirensis Green, 1923, *Bull. ent. Res.* 14 : 90, 91.

HABIT. Described originally from Funchal, Madeira on *Hibiscus rosa-sinensis*, *Sida* sp. and *Acalypha* sp. Specimens are at hand from Tafo, Gold Coast on *Hibiscus mutabilis*, Koforidua, Gold Coast on tomato and an ornamental shrub and from Ibadan, Nigeria on *Lantana*. Green states that the living insect is pale green, dusted with white mealy secretion, the ovisac being loose, white and of irregular form.

RECOGNITION CHARACTERS. Body of adult female elongate-oval, as mounted on the slide measuring approximately 2.5 mm. \times 1.3 mm. Antennae nine-segmented. Legs long and slender, with a denticle on the plantar surface of the claw. Circulus large, narrowing laterally. Ostioles moderately developed, the posterior pair rather more so than the anterior pair. Anal ring with six setae which are a little longer than the diameter of the ring. Eighteen pairs of marginal cerarii present. Anal lobe cerarii each composed of five to six conical setae of various sizes, surrounded by a cluster of trilocular pores. Penultimate cerarius with three conical setae, the anterior



TEXT-FIG. 9. *Phenacoccus madeirensis* Green,

cerarii with two setae except the preocular cerarius with three setae and each ocular cerarius with four setae. Dorsal setae sparse, all slender and small. Dorsal cerarii present on thorax and head, these not numerous and each composed of one or two setae surrounded by four or five trilocular pores, the setae being slender and similar to the others on the dorsal surface. Dorsal multilocular disc pores on the posterior edges of the third to eighth abdominal segments only. On the third and fourth segments these pores are situated in single transverse rows and not present in the mid-region. On the posterior segments the disc pores are numerous in double transverse rows. Tubular ducts of one size, few in number and arranged transversely on the thoracic and abdominal segments. Trilocular pores sparse and evenly distributed.

Ventral surface with a pair of long, stout, anal lobe setae, these nearly twice as long as anal ring setae. Other ventral setae sparse, of various lengths, the longest present on the abdomen and between the antennae. Multilocular disc pores situated on the abdomen only. There are groups of submarginal pores from the third to eighth segments and those in the middle of the segments are distributed as follows: on the fourth segment, four or five are located on either side of the circulus, on the fifth segment there is a double transverse row but only one or two pores are present on the sixth segment. A single row present on the seventh segment, these and the anterior pores, located on the posterior edges of the segments. A transverse group on the first prevulvar segment and also groups on the anterior edge of the segment. Other groups posterior to the vulva. Quinquelocular pores on all segments anterior to the vulva, situated in the mid-region, where they are more abundant on the thorax and between the antennae. On the abdomen they occupy the anterior region of each segment. Ventral tubular ducts of two sizes, the larger ducts of the same size as those on the dorsum and present in a submarginal zone, at the most only two or three to each segment. The smaller ducts are numerous and apart from a few in the mid-region of the thorax they are mainly confined to the posterior abdominal segments. On the sixth segment they replace the multilocular disc pores, and on the seventh segment they are more numerous than the multilocular disc pores and become more abundant laterally. They occupy submarginal positions on the eighth segment and are present on the anal lobes. Trilocular pores sparse, more numerous around the margins.

NOTES. This species comes close to *Phenacoccus franseriae* Ferris, described from Mexico, in having dorsal cerarii and a similar distribution of multilocular disc pores. In *franseriae* the dorsal cerarii are more numerous on the thorax and abdomen but in *madeirensis* these cerarii are more numerous on the head and thorax. The anal lobe cerarii of *madeirensis* are each composed of about five setae whilst in *franseriae* the setae are in pairs.

***Pseudococcus cannae* Green = *Dysmicoccus brevipes* (Cockerell)**

Pseudococcus cannae Green, 1934, *Stylops*, 3: 162.

Pseudococcus cannae Green, Mamet, 1949, *Mauritius Inst. Bull.* 3: 13.

As previously stated this species appears to come within the range of variation of *Dysmicoccus brevipes* (Cockerell) to which it is herein sunk as a synonym.

***Pseudococcus citriculus* Green**

Pseudococcus citriculus Green, 1922, *The Coccidae of Ceylon*, 5 : 377.

Described by Green from Ceylon. Specimens are at hand from Zanzibar on *Citrus* and *Cocos nucifera* collected by M. J. Way. Material has been kindly made available by Dr. R. Mamet from Mauritius on various hosts. This species has been illustrated by Ferris (*in* Zimmerman, 1948) and Ferris (1954).

***Pseudococcus gahani* Green**

Pseudococcus gahani Green, 1915, *Ent. mon. Mag.* 51 : 179.

Pseudococcus gahani Green, Joubert, 1928, *Bull. ent. Res.* 19 : 209.

Pseudococcus gahani Green, Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 180.

This species has been recorded by Joubert from South Africa on pear. It is possible that it is the same as *Pseudococcus fragilis* Brain described from South Africa on orange in which case *gahani* will have to be sunk as a synonym. It is expected that Mr. De Lotto will be dealing with the Brain species and a redescription of *Pseudococcus fragilis* will be given later. A diagram of *gahani* has recently been given by Ferris (1950).

***Rastrococcus iceryoides* (Green)**

Phenacoccus iceryoides Green, 1908, *Mem. Dep. Agric. India, Ent.* 2 : 26.

Dactylopius (*Pseudococcus*) *obtusus* Newstead, 1911, *Mitt. zool. Mus. Berl.* (V) 2 : 164.

Dactylopius (*Pseudococcus*) *obtusus* Newstead, 1913, *Bull. ent. Res.* 4 : 68.

Phenacoccus obtusus (Newstead) Lindinger, 1913, *Jb. hamburg. wiss. Anst.* 30 : 67.

Phenacoccus iceryoides, Green, 1922, *The Coccidae of Ceylon*, 5 : 391.

Rastrococcus iceryoides (Green), Ferris, 1954, *Microentomology*, 19 : 55.

This species was originally described from India. In the Ethiopian Region it has been recorded only from Tanganyika and Zanzibar under the name *P. obtusus* Newstead. Green (1922) synonymized the latter with his *iceryoides*. Recently it has been redescribed and illustrated by Ferris (1954).

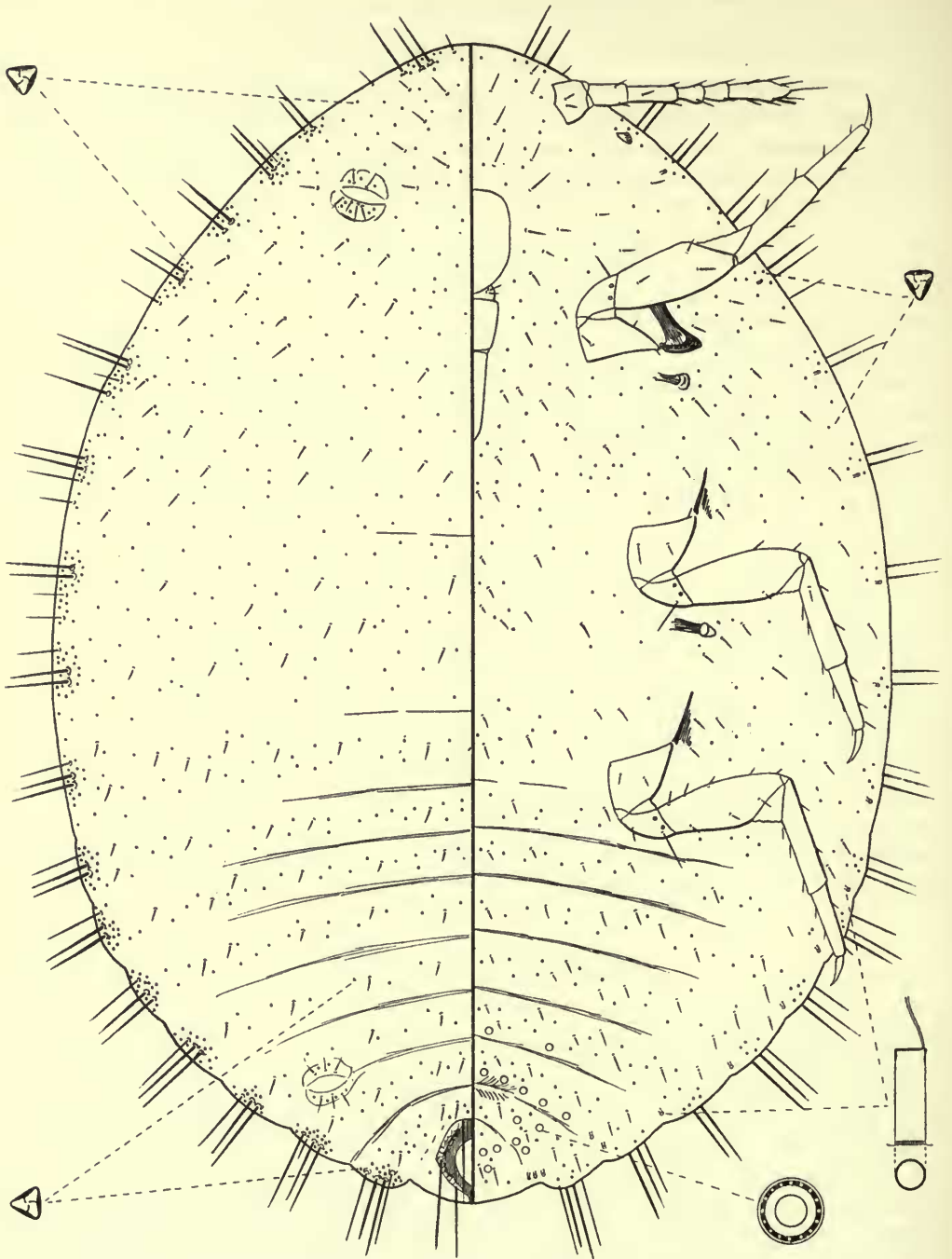
***Ripersia longisetosa* Green**

(Text-fig. 10)

Ripersia longisetosa Green, 1924, *Bull. ent. Res.* 15 : 47, 48.

HABIT. Described by Green from Table Mountain 1,000 ft., South Africa in nests of an ant (*Plagioleps* sp.). Green gave no description of the external covering.

RECOGNITION CHARACTERS. Adult female broadly oval measuring approximately 1.2 mm. × 0.9 mm. on the slide and thus a rather small species. Antennae six-segmented. Legs normal, claws long and slender each with an extremely minute denticle. Circulus absent. Anterior and posterior ostioles well developed. Anal ring normal, with six setae. Cerarii numbering seventeen pairs of a distinctive type. Each cerarius composed of long, pointed setae about as long as the anal ring setae.



TEXT-FIG. 10. *Ripersia longisetosa* Green.

Anal lobe cerarii usually with two stout and two slender setae but all of similar length and surrounded by a cluster of trilocular pores. The anterior cerarii similar to anal lobe cerarii, each with one or two stout setae and one or two slender setae. Between some of the cerarii are often a few setae of a similar shape to those in the cerarii but these are shorter and not constant in position. Dorsal tubular ducts absent. Trilocular pores evenly distributed, not numerous. Dorsal setae sparse and of moderate length.

Ventral surface without sclerotization on the anal lobes. Anal lobe setae about the same size as the long cerarian setae. Multilocular disc pores not numerous, present on the seventh and posterior segments only and numbering about thirty altogether, those on the two prevulvar segments in single transverse rows. Tubular ducts few, of one size and arranged singly on the margins of the segments except on the eighth segment and the anal lobes where there are groups of two to three ducts. Trilocular pores sparse. Setae of various sizes but all slender and not numerous.

NOTES. The distinctive features of this species are the unusually long setae of the cerarii combined with the six-segmented antennae and the few multilocular disc pores. The description is based on two type slides each containing four specimens. Except for one or two specimens the cerarian setae have been completely broken off at the bases. The species cannot be placed with certainty in any known genus. The denticle on each claw is hardly perceptible, as was noted by Green in his original description, and in some claws it is not discernible.

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